Title:	Interaction of ionizing radiation with matter
Lecture hours:	30
Study period: (summer/winter)	summer
Number of credits:	2
Assessment methods:	The condition for passing the course is obtaining at least 50% of points during the final exam. Assessment criteria: 0-49% unsatisfactory (2) 50-59% satisfactory (3) 60-69% satisfactory+ (3+) 70-79% good (4) 80-89% good+ (4+) 90-100% very good (5)
Language of instruction:	English
Prerequisites:	Foundational Courses: - Mathematical Analysis - General Physics - Quantum Physics - Introduction to Nuclear Physics
Course content:	1. General properties of atomic nuclei (masses, charges, isotopes, isobars, isotones, isomers). 2. Radioactive decays (alpha, beta, gamma, radioactive decay families). 3. Laws of radioactive decay • Natural and artificial sources of radiation in the environment. 4. Nuclear reactions - production of artificial radioactive isotopes. 5. Physical principles of techniques enabling the generation of ionizing radiation. 6. Accelerators for the production of radioactive isotopes, medical accelerators. Interaction of ionizing radiation with matter (light ions, beta radiation - high-energy electron beams, X-rays, and gamma radiation). 7. Types of interactions, absorption of radiation, attenuation of photon beams. 8. Ionizing radiation in medical diagnosis and therapy. 9. Natural and artificial sources of human exposure to radioactive materials. Radionuclides in the human body. Standard man. 10. Surface and internal contamination. Tasks of radiological protection. Individual dosimetry. 11. Methods of detection and dosimetry. Threshold doses. Classification of radioactive sources. 12. Determination of operating conditions for various radiation detectors and spatial dose distribution.
Learning outcomes:	P_W01 - Demonstrates knowledge in the fundamental branches of physics and possesses a general understanding of basic concepts, principles, and theories within the realm of physics and related disciplines, including practical applications in professional activities (K_W01). P_W02 - Understands the corpuscular-wave and radioactive nature of matter (K_W01). P_W03 - Familiar with fundamental concepts used in the field of ionizing radiation detection and dosimetry, as well as contemporary methods of radiation detection (K_W01).

	P_U01 - Capable of analyzing problems and finding solutions based on acquired theorems and methods (K_U01). P_U02 - Proficient in performing quantitative analyses and formulating qualitative conclusions based on these analyses (K_U02). P_U03 - Able to engage in independent learning and understands the necessity of lifelong learning (K_U09). P_U04 - Capable of collaborating with medical personnel in the realm of diagnosis and therapy (K_U10). P_K01 - Recognizes the social aspects of practical application of acquired knowledge and skills, along with the associated responsibilities (K_K07). P_K02 - Possesses the ability to think and act entrepreneurially (K_K08).
Name of lecturer:	Dr Karol Bartosiewicz
Email address:	karol@ukw.edu.pl